



Application No. 09/350,466
Filed: July 9, 1999
Group Art Unit: 1743

REMARKS

1. This is in response to the Office Action mailed 7/5/01. Claims 21-23, 25-29, 31-34 and 37-46 remain pending in this application.

2. Although Group I was elected, Applicant has amended claims 30-33 so that they are dependent upon claims in Group I. As a result, Applicant believes that the entire set of original claims 21-34 and 37-42 (after amendment claims 21-23, 25-29, 31-34 and 37-46) should be examined together.

a. Aside from the fact that claims of Group II now being written as dependent on Group I claims, Applicant believes that they represent the same invention, and there is no distinction between the broad screen analytical detection element (which is claimed to have multiple regions) and the multi-layer broad screen analytical detection element (which has multiple layers instead of regions). (See the Declaration enclosed herewith, which deals, in part, with this issue.)

b. Please cancel claim 30 and replace it with new claim 43.

c. Please cancel claim 24 and replace it with new claim 44.

d. New claims 45 and 46 were added to claim high boiling plasticizer/solvents. Those specified in claim 45 were disclosed on page 14, lines 26-27 of the application. Those claimed in claim 46 were disclosed in Table I (page 9), Example 1 (page 26) and Example 9 (page 31) of the application.

3. The specification has been amended regarding the usage of trademarks.

4. The specification has been amended to correct the reference to Figures 1c and 1d on page 13, line 17. Figure 1 has these subparts, while Figure 2 does not.

A typographical error in Table I on page 9 (the misspelling of propylene) has been corrected.

5. Applicant requests reconsideration of the rejections under 35 USC 112.

a. The term "high boiling plasticizer/solvent" was discussed on page 6, beginning on line 22 of the application, where this material was distinguished from what is considered a typical "plasticizer". The role of the plasticizer/solvent is given as "...permit substances to migrate within the coatings." This is not the general definition of a plasticizer, and was intended to distinguish "plasticizer/solvent" from "plasticizer". See also page 13, line 28 - page 14, line 10.

b. In order for a plasticizer/solvent-containing device to be shelf-stable, the plasticizer/solvent must have a low enough vapor pressure to not evaporate in storage, which implies a high boiling point. This means that the high boiling aspect of the solvent is not needed for performance, but rather for stability. Although it could be applied separately at the time that the device is exposed to the analyte, the device should remain in a ready to use

condition, which means that the plasticizer/solvent should already be present in the coatings.

c. A Declaration is enclosed, which demonstrates, in part, the importance of the plasticizer/solvent in dye migration, and if a too volatile plasticizer/solvent is used, activity is lost on standing. However, it can be restored by wetting the sensor element with more plasticizer/solvent.

d. Claims 21 has been amended to clarify the description of the second region. It is the location for storing radiant energy detectable material before it is measured. The material can either be displaced from the first region or produced from material displaced from the first region. The "produced by material displaced from" is discussed on page page 5, line 29 - page 6, line 21.

e. It is unclear where in claim 38 a similar statement referred to by the examiner ("a second region...") exists. There is a similar clause in claim 36, but claim 36 is in a non-elected group.

f. There is support for the term "multiple small pieces" on page 11, line 18 through page 12, line 4. The concept in this paragraph relates to the fact that size of the analytical element is not critical and can extend from as large as sheets to as small as "multiple small pieces", e.g., as confetti or in shredded form. Applicant believes that the comparison in size to confetti in the disclosure is adequate to define the approximate size of the pieces.

6. Applicant requests reconsideration of the rejections under 35 USC 102. The instant invention is significantly different from the device in Clement.

In the Clement patent, nowhere is it taught to use the analyte-induced desorption from a solid of a dye or dye-forming chemical as a means of detecting an analyte. Clement never uses any form of the words adsorb or desorb. No chemical reaction is necessary in the instant invention to produce a signal. This sensing mechanism is not obvious; the use of a non-specific adsorption/desorption process is not taught in any of the patents referenced by the examiner. Nor is any dye suitable. We can provide many examples of dyes that do not desorb from activated carbon when exposed to the analytes mentioned in our patent.

In the Clement patent, the plasticizer serves only its traditional role of flexibilizing a polymer film. However it is still necessary in Clement to apply the sample in a suitable solvent so that it may penetrate the sensor and chemical reactions and migration can occur.

Another difference with Clement is that Clement's patent is targeted to the analysis of specific analytes (specificity), whereas the fundamental nature of our sensor is that it is a limited-specificity sensor, capable of detecting the presence of specific classes of molecules ("broad-screen"). It is the use of the adsorption/desorption sensing mechanism that provides this capability.

In contrast to the selectivity of the detection elements of the aforementioned patents, there is a need for a detection element that will respond to specific classes of chemicals, rather than just one or two particular chemicals. Many analytes of

interest are actually classes of chemicals, for example PCBs or the BTEX class of EPA regulated pollutants. A low capacity warning system for a gas mask must respond to any material that might adsorb on activated carbon. To detect a class of compounds requires a less chemically specific sensing mechanism, for example one based on physical behavior rather than chemical reactions. It is this need that this invention addresses.

7. Applicant requests reconsideration of the rejections under 35 USC 103.

a. The instant invention relates to a "broad screen detection" device. This is significantly different from the devices previously disclosed, which are specific analyte detectors. There is a benefit of being able to use one detector for an entire class of analytes, rather than to need a specific detector for each analyte. In his enclosed declaration, one inventor has discussed the unexpected benefit of the invention.

b. Burleigh does not teach that indicators can usefully be desorbed from the solids it teaches. In fact, the purpose of the solid in Burleigh is to provide a stable, nonreactive support for indicators that might otherwise react with element components or that might migrate out of the analytical element. Thus Burleigh alone or over Clement is unrelated to the teaching that analyte-induced dye desorption (competitive adsorption/desorption) is a useful analytical method that can be incorporated into layered analytical films. Burleigh alone or over Clement does not teach the need for selection of dyes in combination with

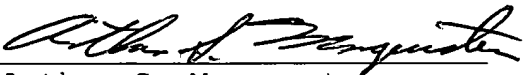
plasticizer/solvent and binder polymers such that the dyes can be desorbed by analyte so as to produce a detectable signal.

c. Clement is discussed above. The combination of Clement with Burleigh would not lead one with expertise in this area to develop a broad screen detector (i.e., one not specific for a given analyte).

8. Applicant would like to schedule a telephone interview with the Examiner to clarify (a) the response to the restriction requirement, (b) nature of the invention, and (c) various aspects of the response. Upon receipt of this Amendment, the Examiner is requested to telephone the undersigned so that an interview can be scheduled.

Respectfully submitted,

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Enclosure



MARKED-UP VERSION OF SPECIFICATION

Page 9, lines 7-11:

Table I

Adsorbate/Adsorbent/Plasticizer	Response
Methylene Blue/ Daree DARCO G-60 carbon/1,4-butanediol	arene>alkene>alkane
Disperse Red 19/ Maxsor MAXSORB carbon/[propylene] propylene carbonate	cyclic alkene>arenes~alkane

* DARCO G-60 is activated carbon from American Norit Co., Inc. MAXSORB is activated carbon from Kansai Coke and Chemical.

Page 12, lines 26-30, continuing on page 13, lines 1-19:

A working embodiment of an integral, multilayer analytical element needs to incorporate several functions: sample capture, competitive desorption, concentration of the released radiant energy-detectable materials and, if the adsorbent is colored or significantly opaque, provision of a background against which the radiant energy-detectable materials can be detected. In certain embodiments, it is possible to combine certain of these functions into single layers. For detection of vapor analytes, it is preferred to construct the element as a three layer structure atop a transparent base, readable by reflectance. Referring to Figs. 1a-1d and to Fig. 2, four components can be present in analytical element (10), in order of distance from the base: the clear plastic base (12) itself, the concentrating layer (14) such as a dye mordanting layer, a reflecting layer (16), e.g., a white pigment, that also is sufficiently opaque to appear white under a dark adsorbent, and the adsorbent/indicator layer (18), which for

vapor detection serves also as the sample capture layer. As illustrated in Fig. 1a, analytes in the vapor phase (v) diffuse into adsorbent/indicator layer (18), where, as shown in Fig. 1b, the analytes to be detected competitively displace the displaceable dye or dye precursor adsorbed onto the adsorbent. Figs. 21c and 21d show displaced dye molecules diffusing through reflecting layer (16) and collecting in concentrating layer (14), where they are detectable through clear plastic base (12).

Page 15, lines 18-30, continuing on page 16, lines 1-3:

For the opposite polarity situation, in which the choice of a polar adsorbent like silica or alumina and a relatively nonpolar dye leads to the choice of a hydrophobic, less polar solvent, there is a wide range of possible commercially available solvents that could be paired with standard thermoplastic polymers. Examples of suitable solvents include dialkyl diesters such as those sold as the DBE series (DuPont), diesters of aryl compounds including those commonly used as plasticizers for, e.g., polyvinyl chloride, polyvinyl acetate, cellulose nitrate, and the like, such as diethyl phthalate, long chain esters such as isopropyl palmitate, phosphate esters like tributyl phosphate, liquid chloroparaffins, sulfonamides like N-ethyl-o,p-toluenesulfonamide, amides such as diethyl lauramide, ethoxylated or propoxylated phenols such as ~~Igepal~~ IGEPAL OD-410 (Rhodia), and many others. A specific example might be the combination of polystyrene with dimethyl sebacate.

Page 16, lines 12-20:

It may also be desirable to crosslink one or more layers to control swelling during overcoating. The choice of crosslinker will of course be dependent on the binder and drying conditions chosen. Alternatively, polymers that become insoluble on drying, for instance polyvinyl acetate lattices, or ones that become insoluble on heating such as ammonium salts of base-soluble but neutral water-insoluble polymers like ~~Carbo-set~~CARBOSET 525 (BFGoodrich) or ~~Scrip-set~~SCRIPSET 520 (Solutia), can provide swelling control either as primary binders or as additives.

Page 18, lines 23-30, continuing on page 19, lines 1-13:

For anionic dyes, such as those commonly used in photographic applications, a wide range of cationic polymers, both commercial and custom-made, have been proposed. Commercial materials mentioned in prior art include the ~~Mirapol~~MIRAPOL line of cationic polymers (Rhodia), the ~~Celquat~~CELQUAT cationic polymers (National Starch), cationic lattices such as HX42-1 (Interpolymer Corp.), hydroxypropyl trimethyl ammonium chloride hydroxyethylcellulose (~~Polymer~~POLYMER JR, Amerchol), and many others. These materials may be diluted in film forming neutral polymers such as polyvinylpyrrolidone, polyvinyl alcohol, cellulose ethers, polyvinyl butyral, polyacrylamide, or any other polymers that are compatible with the mordant and plasticizer/solvent and permeable to dye. Cationic dyes may be mordanted with anionic polymers such as carboxymethyl cellulose, polystyrenesulfonic acid salts, polyacrylic acid salts, naturally occurring anionic polymers such as alginic acid and carrageenan, copolymers of maleic acid such as those in the ~~Gantrez~~GANTREZ line (ISP), and many others. These may be diluted with compatible nonionic polymers such as those

mentioned earlier. The polymer counterions may be varied to adjust compatibilities, regulate crosslinking, and achieve differing degrees of dye affinity.

Page 19, lines 14-27:

For most purposes, it is desirable that this layer be transparent and uncolored. This is achieved by selecting components for compatibility in both the wet and dry states. This includes small molecules such as the plasticizer/solvent(s), preservatives, and surfactants. The last can be of value in insuring optimal coating quality, thereby maximizing transparency. In general, it is desirable to avoid surfactants with charge opposite to the mordanting polymer. Thus, for cationic mordants, a cationic wetting or leveling agent may be used, for example ~~Fluorad~~FLUORAD FC-135 (3M) or ~~Aeroseal~~AEROSOL C-61 (Cytec). Anionic mordants can benefit from anionic wetting agents such as ~~Aeroseal~~AEROSOL OT (Cytec) or ~~Rhodaqual~~RHODACAL DSB (Rhodia). Of course, either type of mordant could be compatible with many of the typical nonionic and amphoteric surfactants.

Page 19, lines 28-30, continuing on page 20, lines 1-18:

It is generally necessary for the mordant layer to be largely insoluble in the solvent being used to coat the next layer atop it. This may be achieved either by appropriate selection of component polymers, by design of the overcoat fluid, or by crosslinking the mordanting layer. For example, a hydrophilic mordant layer such as one composed of sodium carboxymethylcellulose would tolerate being overcoated with a

reflecting layer using an organic solvent such as isopropanol or 2-butanone as its solvent. If it is desired to coat the overcoat from water, the mordant layer can have its solubility and degree of swell reduced to a usable level by adding water-insoluble binders such as polyvinylbutyral (added as e.g. an alcoholic solution), self-crosslinking binders like ~~Gohsefimer~~ GOHSEFIMER Z-200 (a modified polyvinyl alcohol available from Performance Chemicals, Inc.) or X-LINK 25-2813 (a self-crosslinking vinyl acrylic latex from National Starch), or standard crosslinkers for functionalities present in one or more of the polymers in the mordant layer, for example, a titanate ester such as ~~Tyzer~~ TYZOR LE (DuPont), if carboxylic acid units are present, or materials like 1,4-butanediol diglycidyl ether, ~~Polycup~~ POLYCUP 172 (Hercules), or glyoxal if hydroxyl groups are present.

Page 22, lines 4-10:

These core-shell pigments display reduced dye photodegradation and easier dispersability which are both desirable. Examples of such modified titanium dioxides can be found in most titanium dioxide pigment manufacturer's lines, as exemplified by the pigments of the ~~Ti-Pure~~ TI-PURE R-900 line (DuPont), Kemira's RDD and 650, Kronos 2310, 2102 and 2160, and similar pigments.

Page 22, lines 11-24:

The amount of pigment in the layer can vary over a wide range, depending on the particular pigment, how well dispersed it is, what other materials are in the pigment layer, and how thick this

layer is coated. For titanium dioxide, coverages can range from 5 g/m² to 40 g/m², preferably in the range of 10 to 25 g/m². Layer thickness can be in the range of from 3 to 30 μ m, preferably from 5 to about 20 μ m. Pigment volume concentration can range from 25 percent to 75 percent, limited by the rheology of the coating fluid, the mechanical integrity of the dry layer, and the resistance to dye passage through this layer caused by the solid pigment particles. The required amount of titanium dioxide can be reduced by incorporation of low refractive index particles such as polytetrafluoroethylene latices or ~~Repaque~~ROPAQUE (Rohm & Hass) air encapsulates as is well known in the paint industry.

Page 23, lines 17-30, continuing on page 24, lines 1-5:

Titanium dioxide is generally dispersed in aqueous media with the aid of low molecular weight, anionic polymers such as polyacrylates like ~~Colloid~~COLLOID 111 (Rhodia), polymethacrylates such as ~~Daxad~~DAXAD 30 (Hampshire Chemical), naphthalenesulfonate-formaldehyde condensates such as ~~Tamol~~TAMOL (Rohm & Hass), or blends with surfactants such as ~~Surfynol~~SURFYNOL CT-131 (Air Products). Small molecules like pyrophosphate salts and anionic surfactants such as ~~Geropon~~GEROPON SS-0-75 (Rhodia) may also be suitable. It is desirable that the charge on the dispersant be the same as that of the dye or dye precursor, so as to avoid mordanting of the dye in the reflecting layer. For cationic dyes, cationic dispersants such as ~~Aerosol~~AEROSOL C-61 (Cytec), ~~Witflow~~WITFLOW 953 (Witco), and cationic polymers like ~~Nalco~~NALCO TX 7991 (Nalco Chemical) may be useful. Alternatively, nonionic dispersants such as the ~~Soprophor~~SOPROPHOR series (Rhodia), ~~Glucopon~~GLUCOPON 425N (Henkel), or ~~Gafac~~GAFAC P-904

(ISP) may be tried, but they are generally somewhat less effective. Mixtures of charged and uncharged dispersants are also useful. Similar more hydrophobic dispersants of all three charge types are available for use in organic solvent-based coating fluids.

PAGE 24, LINES 6-10:

It may also be of value to use a pigment wetting or grind aid as part of the dispersion process. Representative materials include ~~Surfynol~~SURFYNOL 104, CT-121, and CT-136 (Air Products), ~~Witco~~WITCO 960, ~~Witflow~~WITFLOW 963 (Witco), and ~~Disperbyk~~DISPERBYK 183 (Byk). ~~Surfynol~~SURFYNOL CT-136 and ~~Disperbyk~~DISPERBYK 183 can also serve as dispersants.

Page 24, lines 16-27:

Other additives commonly used in the coatings, such as wetting agents, defoamers, and biocides can be incorporated into the coating. There are a wide selection of suitable materials commercially available. The primary requirement these materials must meet for use in a dye desorption analytical element is that they must either not be able to migrate to the detection layer, or should not be able to displace dye from the adsorbent. Some materials that have proven useful in systems based on activated carbon adsorbent include sodium benzoate and methanol as biocides, ~~Surfynol~~SURFYNOL 104PA and ~~Surfynol~~SURFYNOL 61 as wetting agents, and ~~Surfynol~~SURFYNOL DF-210 defoamer.

Page 25, lines 1-15:

Detecting Layer

Over the reflecting layer is coated the layer containing the dye desorption detection system. Exemplary adsorbents useful in the detection system include activated carbon, silica, alumina, ion exchange resins and molecular sieves. Also useful are polymers or polymer latices capable of binding dyes ion exchange resins like ~~Amberlite~~ AMBERLITE IR 120 (Rohm & Hass) and molecular sieves such as 4A° sieves (W. R. Grace). Also useful are polymers or polymer latices capable of binding dyes. For example, polymers containing vinylpyrrolidone units are known to have an affinity for many classes of dyes, but as the interactions are weak, other molecules with comparable polarity and hydrogen-bonding characteristics could serve to displace these dyes and hence be detected. Particulate neutral polymeric adsorbents such as ~~Amberlite~~ AMBERLITE XAD series (Rohm & Hass) are also applicable.

Page 26, lines 3-17:

Finding appropriate binders is a process that is sensitive to the choice of plasticizer/solvent as well as adsorbent and dye or dye precursor. For example, although in an analytical element for the detection of aromatic hydrocarbons by desorption of Methylene Blue from activated carbon using a diol plasticizer/solvent, polyvinyl alcohol is a satisfactory binder for a titanium dioxide reflective layer, but not for the activated carbon detecting layer. However, cellulosic polymers such as ~~Klucel~~ KLUCEL (Hercules) or ~~Methocel~~ METHOCEL (Dow) do permit dye to leave the carbon surface and migrate to the mordant layer. Similarly, wetting agents and other coating aids must be selected carefully

to avoid interference with the detection system. Combinations of polymers may be particularly useful in this layer to maximize permeability to both analytes and dyes while providing the mechanical robustness necessary for an unprotected top layer.

Page 26, lines 25-30, continuing on page 27, lines 1-13:

Example 1

A vapor detection system based on dye desorption was prepared as follows: a mordant layer comprising the commercially available polymer ~~Gantrez~~GANTREZ AN-169 (ISP) at 1300 mg/m², 2-methyl-1,3-propanediol at 7786 mg/m², and ~~Rhodacal~~RHODACAL DSB (Rhodia) at 13.0 mg/m² was coated from water using a wound-wire rod onto a transparent, subbed polyester support from water and dried 5 minutes at 115 °C. Over this layer was coated a reflecting layer containing the following materials:

<u>MATERIAL</u>	<u>COVERAGE (mg/m²)</u>
Ti-Pure <u>TI-PURE</u> R-900 titanium dioxide (DuPont)	26,087
dispersant Daxad <u>DAXAD</u> 30 (Hampshire Chemical)	137
wetting agent Surfynol <u>SURFYNOL</u> 104PA (Air Products)	1565
defoamer Surfynol <u>SURFYNOL</u> DF-210 (Air Products)	1159
2-methyl-1,3-propanediol (Arco Chemical)	579
Airvol <u>AIRVOL</u> 107 (Air Products)	2673
ammonium titanium lactate (50% solution) (Aldrich)	406

Page 27, lines 14-28:

These materials were coated from an aqueous dispersion that was prepared using a rotor-stator homogenizer. The coating fluid was applied using a wound-wire rod. The resultant two-layer structure was oven-dried for 20 minutes at 115 °C. The magenta dye

~~Pyronin~~Pyronin Y was adsorbed from water onto ~~Daree~~DARCO G-60 activated carbon (NORIT) at 60 mg/g carbon. The dye loaded carbon was then used to prepare a sensing layer composed as follows:

<u>MATERIAL</u>	<u>COVERAGE (mg/m²)</u>
Pyronin Y on carbon	4930
2-methyl-1,3-propanediol	9076
Methocel <u>METHOCEL</u> K35LV hydroxypropylmethylcellulose (Dow)	148
polyethylene oxide 600K (Aldrich)	58.3
Witebond <u>WITCOBOND</u> W-213 polyurethane latex (Ashland Chemical)	430

Page 27, lines 30-32, continuing on page 28, lines 1-2:

This layer was coated from water with a wire-wound rod, and air-dried. The completed detector was tested by attaching it to a clear glass plate that was then glued with ~~Poelecton~~POLECTRON 430 adhesive latex (ISP) onto a jar containing a small beaker of test solvent that served as a source of vapors to be detected.

Page 28, lines 13-33, continuing on page 29, lines 1-5:

Example 2

Different mordant layers were prepared from ~~Gantrez~~GANTREZ AN-169 in a manner analogous to Example 1, except that the amount and type of base was varied. Bases used included sodium and potassium hydroxides and lithium carbonate, as well as amines including ethanolamine, diethanolamine, and triethanolamine (all from Aldrich). These mordants were used to prepare multi-layer structures comparable to Example 1. All gave significant color on exposure to toluene vapors. Maximum optical densities were as follows:

<u>BASE</u>	<u>DYE</u>	<u>%NEUTRALIZATION</u>	<u>MAGENTA Dmax (Dmin)</u>
ethanolamine	Pyronin Y	100	1.43 (0.20)
diethanolamine	"	100	1.56 (0.20)
triethanolamine	"	100	1.45 (0.19)
triethanolamine*	"	100	1.15 (0.19)
triethanolamine	"	33	1.71 (0.19)
NaOH	"	33	1.71 (0.20)
Li2CO3	"	33	1.76 (0.19)
no base	"	0	1.72 (0.22)
NaOH	Methylene Blue (Aldrich)	33	2.06 (0.19)
KOH	"	33	1.39 (0.19)
NaOH	Thionin perchlorate (Aldrich)	33	1.45 (0.22)
no base	"	0	2.12 (0.21)

- ~~Gantrez~~GANTREZ ES-225 in place of ~~Gantrez~~GANTREZ AN-169

Page 29, lines 24-34:

Example 4

An alternative mordant layer was formulated as follows:

<u>MATERIAL</u>	<u>COVERAGE (mg/m²)</u>
Versa <u>VERS</u> A TL-502 polystyrenesulfonate (Alco Chemical)	460.7
Gohsefimer <u>GOHESFIMER</u> Z-200 (Performance Chemicals)	26.50
Airvol <u>AIRVOL</u> 125 (Air Products)	1677.0
polyvinylpyrrolidone K-15 (ISP)	462.4
1,2-propanediol (Aldrich)	21269.0
NaOH	3.40
Rhodacal <u>RHODACAL</u> DSB surfactant	105.1

Page 30, lines 1-9:

Example 5

An alternative carbon layer was formulated as follows:

<u>MATERIAL</u>	<u>COVERAGE (mg/m²)</u>
Pyronin PYRONIN Y on carbon	
5151.5	
2-methyl-1,3-propanediol	9485.0
METHOCEL K35LV hydroxypropylmethylcellulose	154.3
polyethylene oxide 600K	60.9
Dur-O-Set DUR-0-SET SB-321 polyvinyl acetate latex (National Starch)	258.6

Page 30, lines 11-28:

Example 6

The maximum viewing surface dye densities resulting from exposure to various vapors of the coated structure of Example 1 were determined by reflection densitometry using an ~~X-Rite~~ X-RITE 310 densitometer (X-Rite Systems, Grandville, MI) in Status A mode. Two coatings were compared, that of Example 1 and another identical except for the replacement of ~~Pyronin~~ PYRONIN Y by the blue-violet dye Thionin perchlorate.

	<u>Pyronin Y 60 mg/g</u> <u>on Darco G-60</u>	<u>Thionin ClO4</u> <u>120 mg/g on Darco G-60</u>
toluene	0.71/0.30/1.72/0.99	1.69/1.09/2.11/0.63
CH ₂ Cl ₂	0.56/0.41/1.03/0.62	1.59/1.15/1.76/0.72
amyl acetate	0.49/0.27/1.01/0.52	0.57/0.47/0.53/0.37
i-octane	0.18/0.18/0.23/0.21	0.25/0.24/0.25/0.24

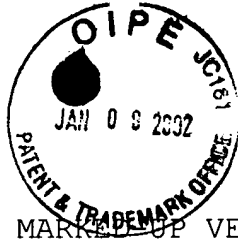
Dye densities are in units of reflectance optical density in the order visual/cyan/magenta/yellow. Unexposed material has D_{min} = 0.18/0.19/0.22/0.21.

Page 31, lines 10-18:

Example 8

The effect of toluene vapor on three devices identical except for containing three different dyes was examined. The dye loadings were chosen to give comparable D_{min} values:

<u>Dye</u>	<u>Dmin</u>	<u>Dmax</u>
Pyronin PYRONIN Y	0.10/0.09/0.10/0.11	1.19/0.58/2.63/1.97
Methylene Blue	0.11/0.11/0.11/0.12	1.82/1.32/2.06/1.27
Thionin perchlorate	0.15/0.12/0.12/0.12	2.49/1.98/2.64/1.29



MARKED UP VERSION OF CLAIM AMENDMENTS

21. A broad screen analytical detection element, capable of detection of several classes of gas or liquid analytes, said detection element comprising

a first region comprising a solid and adsorbed on said solid a radiant energy-detectable material or a material capable of producing a radiant energy-detectable material, wherein said radiant energy-detectable material or said material capable of producing a radiant energy-detectable material is displaceable by a target analyte; and

a second region for sequestering radiant energy-detectable material

(a) displaced from or

(b) produced by material displaced from

said solid prior to detection of said radiant energy-detectable material,

wherein either said first region or said second region further comprises a high boiling plasticizer/solvent.

25. The analytical detection element of claim [21] 44 wherein said [detection element is in a single layer that can be] first region is applied to a surface as a coating material.

31. The ~~multi-layer~~analytical detection element of claim ~~30~~ 43, wherein said sample capture layer is near the top of the layer stack of said detection element.

32. ~~(New)~~ The ~~multi-layer~~analytical detection element of claim ~~30~~ 43, wherein said sample capture layer is at the top of the layer stack of said detection element.

33.—(New) A broad screen analyte detection badge comprising the
~~multi-layer~~broad screen analytical detection element of claim
3043.